DIRECT TESTIMONY OF

HENRY E. DELK, JR.

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

DOCKET NO. 2019-2-E

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION WITH SOUTH CAROLINA ELECTRIC & GAS COMPANY ("SCE&G" OR "COMPANY").

A. My name is Henry E. Delk, Jr., and my business address is 220 Operation Way, Cayce, South Carolina 29033. I am employed by SCE&G as General Manager, Fossil Hydro Operations.

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR BUSINESS EXPERIENCE.

A. I graduated from Clemson University in 1993 with a Bachelor of Science degree in Mechanical Engineering and earned a Master of Business Administration from the University of South Carolina in 2000. I began my career with Milliken & Company in 1993 working as a Process Improvement Engineer. After three years, I accepted a position with Clariant Corporation as a Project Engineer. I began my career with SCE&G in 1997 in the Rate Department as a Rate & Regulatory

Specialist. In 2000, I transferred to Electric Transmission and assumed a position within the System Control department as a System Controller. Within Electric Transmission, I served as Supervisor/Manager of Operations Planning from 2001 to 2007 and Manager of System Control from 2007 to 2012. I transferred to the Electric Operations division in 2012 to 2013 working as Manager of Northern Division Transmission Operations and Local Manager of the Lexington and Chapin Crew Quarters. From 2013 to 2014, I served as Director of Power Marketing. I assumed the role of General Manager, Fossil Hydro Technical Services in June 2014. In September 2017, I assumed my current position as General Manager, Fossil Hydro Operations.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to review the operating performance of SCE&G's Fossil Hydro units and South Carolina Generating Company's ("GENCO") Williams Electric Generating Station ("Williams Station") during the period January 1, 2018, through December 31, 2018 ("Review Period").

Q. PLEASE GIVE A SHORT DESCRIPTION OF SCE&G'S FOSSIL AND HYDROELECTRIC FACILITIES.

A. SCE&G currently operates four (4) coal-fired steam units (1,704 megawatts ("MW")), three (3) gas-fired steam units (345 MW), eleven (11) combined-cycle

gas turbine/steam generator units (gas/oil fired, 1,814 MW), sixteen (16) peaking turbines (339 MW), four (4) hydroelectric generating facilities (216 MW), and one (1) pumped storage facility (576 MW). The total net non-nuclear summer generating capability rating of these facilities is 4,994 MW. The ratings stated in this testimony are updated on an annual basis.

Q. DOES SCE&G OPERATE RENEWABLE GENERATORS?

A. Yes. SCE&G also owns and operates a thin laminate solar generation system on ten acres of rooftop at Boeing's North Charleston production facility. At peak capacity, this system generates 2.6 MW (DC nameplate).

Q. HAVE THERE BEEN ANY CHANGES TO THE MAKEUP OF SCE&G'S FOSSIL HYDRO GENERATION FLEET?

A. Yes. On May 9, 2018, SCE&G completed its acquisition of an approximately 540 MW rated combined cycle gas-fired generation facility and equipment located near Gaston, South Carolina, ("Columbia Energy Center") from Columbia Energy, LLC. The Commission approved the transfer of the Certificate of Environmental Compatibility and Public Convenience and Necessity for the Columbia Energy Center from Columbia Energy, LLC to SCE&G in Order No. 2018-272 in Docket No. 2018-25-E.

SCE&G also sold to KapStone Charleston Kraft LLC ("KapStone") the biomass generator (85 MW) located at the KapStone facility in North Charleston, South Carolina upon expiration of the contract on December 31, 2018. KapStone is now its own primary supplier of electric energy at its North Charleston facility and has SCE&G to serve as a secondary backup supplier of such energy.

Q. PLEASE DESCRIBE GENCO AND ITS RELATIONSHIP TO SCE&G.

A. GENCO owns Williams Station and was incorporated on October 1, 1984, as a SCANA subsidiary. GENCO sells to SCE&G the total capacity and entire output from the Williams Station under a Unit Power Sales Agreement approved by the Federal Energy Regulatory Commission. For purposes of this testimony, I include Williams Station when I refer to SCE&G's coal-fired steam plants.

Q. HOW MUCH ELECTRICITY WAS GENERATED BY SCE&G IN THE REVIEW PERIOD?

A. In the Review Period, SCE&G generated 24,168,742 megawatt hours ("MWH") of energy. Of this energy, the coal-fired steam units generated approximately 35%, the combined-cycle units generated approximately 36%, the nuclear plant generated approximately 20%, the gas-fired steam units (Urquhart Unit No. 3 and McMeekin Unit Nos. 1 & 2) generated approximately 4%, the peaking gas turbines and hydro units generated approximately 4%, and the biomass

cogeneration facility and the solar generation facility together generated approximately 1%. By fuel, natural gas accounted for 41% of the total energy generated, coal accounted for 35%, nuclear accounted for 20%, hydropower accounted for 3%, and SCE&G-owned biomass and solar accounted for 1%. Exhibit No. ___ (HED-1) provides a graphic display of how the Company's generation met our customers' demand for energy during this Review Period by unit type and by fuel.

Q. PLEASE SUMMARIZE THE PERFORMANCE OF THE FOSSIL HYDRO UNITS.

A. SCE&G's Fossil Hydro units operated efficiently and dependably during the Review Period. SCE&G's fossil units (including combined-cycle units) had an availability factor of 83.48%.

During the Review Period, SCE&G's fossil units (including combined-cycle units) had a forced outage factor of 0.51%. The "forced outage factor" is the percentage of the total hours that generating units are forced out of service (for various reasons) compared with the number of hours in the period.

Q. PLEASE DISCUSS THE SIGNIFICANT PROJECTS UNDERTAKEN DURING SCE&G'S MAINTENANCE OUTAGES FOR THE REVIEW PERIOD.

A. As part of the Company's ongoing maintenance program, SCE&G undertook a number of significant projects during its maintenance outages in this Review Period. A brief description of major work is as follows:

- **Williams Station** conducted a planned outage during Fall 2017. This outage was discussed in my testimony in last year's fuel proceeding. The primary work completed during this outage included: replacement of the main cooling tower, replacement of the rotary car dumper, installation of a redundant limestone ball mill, replacement of reheat pendant tubes in the boiler, replacement of burner tube panels in the boiler, inspection of the turbine, and major repairs to the high pressure/intermediate pressure turbine shell. This outage started on September 3, 2017, and the unit returned to service on January 19, 2018, approximately seven (7) weeks later than planned due to site evacuations during Hurricane Irma and a winter ice storm, additional work identified during the repairs to the high pressure/intermediate pressure turbine shell, certain work requiring schedule updates to reflect more time to complete than originally estimated by the vendor, and certain issues during start-ups of the unit in early January requiring further repairs.

- **Urquhart Station** completed a planned outage of all units during Spring 2018. The primary work completed during this outage included a major steam turbine overhaul of Unit No. 3 and inspections of associated steam turbine valves, condenser tube replacements on all three steam units, and motor control center replacements on Units No. 1 and 2. Other work performed during this outage included the cooling tower replacement on gas turbine No. 4 and inspections to high energy piping on Units No. 1 and 3.
- **Jasper Station** also conducted a planned outage during Spring 2018. The primary work completed during this outage included a hot gas path inspection on Unit No. 1 and inspections of steam turbine valves and bearings on Unit No. 4. In addition, heat recovery steam generator (HRSG) penetration seals were replaced and modifications were made to HRSG hangers. Condensate and circulating water pumps were replaced and inspections to high energy piping were completed.
- **Cope Station** completed a planned outage during Fall 2018. The primary work included inspection of the generator field per GE Technical Information Letter 1292. In addition, a generator re-wedge was performed, various pumps and valves were rebuilt/refurbished, and natural gas ignitors/burners were installed in the auxiliary boiler. Scaffolding of the main boiler was built to replace burners as well as to conduct an inspection and make repairs to areas deemed necessary.

- **Columbia Energy Center** completed a planned outage during Fall 2018. The primary work completed during this outage included a major inspection of Units 1 and 2, replacement of the thrust bearing on Unit No. 2, inspection of the generator on Unit No. 3, high energy piping inspections, and modification to the HRSG low pressure superheat header.
- **Saluda Hydro Nos. 1 and 2** conducted a planned outage during Fall 2018 to install upgraded control systems on both units.
- **Urquhart No. 3** conducted a planned outage during Fall 2018 to remedy issues identified during the Spring 2018 outage discussed previously. The primary work during this outage included applying a balance shot to the rotor; however, upon inspection, visual damage to low pressure turbine blades was discovered. Further inspection revealed extensive damage to turbine blades and the diaphragm requiring disassembly of the unit for shipment to a shop for major repairs.

Q. PLEASE DISCUSS ANY SIGNIFICANT FORCED OUTAGES FOR THE PERIOD UNDER REVIEW.

A. SCE&G's Fossil Hydro Operations defines a significant forced outage as any forced outage in excess of seven (7) days. Fossil Hydro had no significant forced outages during the Review Period.

Q. WHAT WAS SCE&G'S FOSSIL SYSTEM FORCED OUTAGE FACTOR FOR THE PERIOD UNDER REVIEW?

A. For the Review Period, SCE&G's fossil units (including coal-fired and natural gas-fired steam units and combined-cycle units) experienced a system forced outage factor of 0.51%. SCE&G's forced outage factor of 1.53% for coal-fired units compared favorably to the North American Electric Reliability Council ("NERC") national five-year (2013-2017) average of 4.88% for forced outage factors on all coal-fired units. SCE&G's forced outage factor of 0.21% for its combined-cycle units was much lower than the NERC national five-year (2013-2017) average for combined-cycle units of 2.48%. SCE&G's gas-fired steam units forced outage factor of 0.15% for the Review Period was much better than the NERC national five-year (2013-2017) average of 5.13% for gas-fired steam units.

Q. PLEASE DISCUSS THE AVAILABILITY OF SCE&G'S FOSSIL PLANTS DURING THE REVIEW PERIOD.

A. Availability factor is a measure of the actual hours that the generation units are available (overall readiness to provide electricity) divided by the total hours in the Review Period. Availability is not affected by how the unit is dispatched or by the demand from the system when connected to the grid. However, it is impacted by the planned and unplanned shutdown hours. SCE&G's fossil plants (including coal-fired and gas-fired steam units as well as combined-cycle units) had an

availability factor of 83.48% during the Review Period. For comparison purposes, the NERC national five-year (2013-2017) average for availability from all coal-fired units was 84.04%, and SCE&G's availability for its coal-fired units for 2018 was 85.84%. SCE&G's combined-cycle availability factor of 84.47% was a little lower than the NERC national five-year (2013-2017) average for combined-cycle units of 87.89% primarily due to major outages at Jasper and Urquhart Stations in the Spring and a major outage at Columbia Energy Center in the Fall. SCE&G's gas-fired steam units' availability factor was 77.03% for the Review Period which was lower than the NERC national five-year (2013-2017) average of 82.34% for gas-fired steam units due to the major outage extension on Urquhart Unit No. 3 in the Spring and Fall.

Q. PLEASE EXPLAIN "HEAT RATE" AND DESCRIBE THE HEAT RATE OF THE FOSSIL UNITS DURING THE REVIEW PERIOD.

A. Heat rate is a way to measure the thermal efficiency of a power plant. It is the number of British Thermal Units ("Btu") of fuel required to generate one (1) kilowatt-hour ("kWh") of electricity. Simply put, the lower the heat rate, the more efficient the plant.

The coal-fired steam unit average system heat rate for the Review Period was 10,045 Btu/kWh. Cope Station had the best heat rate on our system at 9,635 Btu/kWh. For comparison purposes, the most recent data published by Power

Engineering magazine in June 2018 indicates that the national average for heat rate for 2017 for all coal-fired units is 10,476 Btu/kWh.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.